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| EXAMINER | |
|---|---|
| SMITH, JENNIFER A | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1793 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/524,083 | CHU, HUMBERT | |
| | Examiner | Art Unit | |
| | JENNIFER A. SMITH | 1793 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *11 January 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Status of Application*

Claims 1 and 13 have been amended.

Claims 1-20 are pending and presented for examination.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1, 2, and 4-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Cabrera et al. (US Patent No. 4,849,091).**

In regard to newly amended claim 1, Cabrera et al. teach an apparatus and for the regeneration of a catalyst, especially in Figure 1. The regenerator has a first section (7 and 8) which receives a carbon-contaminated catalyst and air (oxygen-containing gas) through conduit (1). The catalyst and combustion gas flow upward concurrently [See Column 3, lines 54-56]. The regenerator has a second 'disengagement space' (11). **The spaces are of two different widths, with the width of the second space (11) greater than the space of the first section (7 and 8) as shown in Figure 1. The transitional portion which separates space (7) and space (8) is tapered as shown in Figure 1**. The riser regeneration zone (8) is operated at a higher gas velocity than

the other sections due to its reduced cross section [See Column 6, lines 57-59]. **Cabrera et al. teach continuously adding spent catalyst into the regenerator at a rate of 1,354,634 kg/hour [See Column 13, lines 28-30].** The primary function of the first regeneration stage comprising combustion zone (7) and riser regeneration zone (8) is to maximize coke combustion to carbon monoxide while limiting the combustion of CO to $CO_2$ [See Column 6, lines 56-66]. The streams in the disengaging space (10) are combined with a second regeneration gas to convert the CO from the first stage. The disengaging space has a $CO_2$/CO mol ratio of between 1 to 5 and of course greater than the same ratio in the regeneration gas exiting the riser [See Column 8, lines 8-11 or Column 17, lines 7-28]. **While the Cabrera reference does not teach a ratio of CO:$CO_2$ above 9, this represents a functional limitation. "Note that an apparatus claim with process steps is not classified as a "hybrid" claim; instead, it is simply an apparatus claim including functional limitations." See MPEP 2106 B. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. See MPEP 2114. The apparatus taught by the Cabrera reference is capable of operating within the limitations set in the claims based upon the optimization of flow rate, space velocity, and entrance gas constituents.** Figures 1 and 2 of Cabrera et al. are illustrated below:

Figure 1

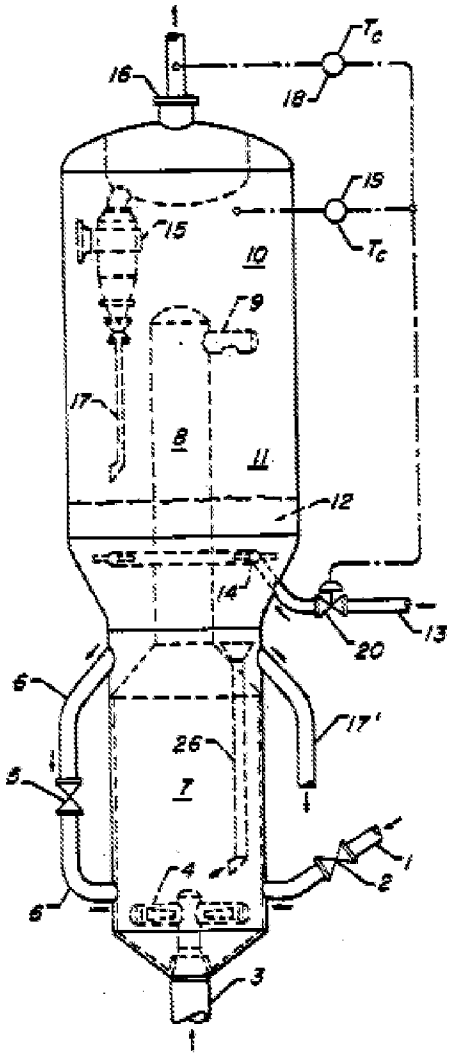
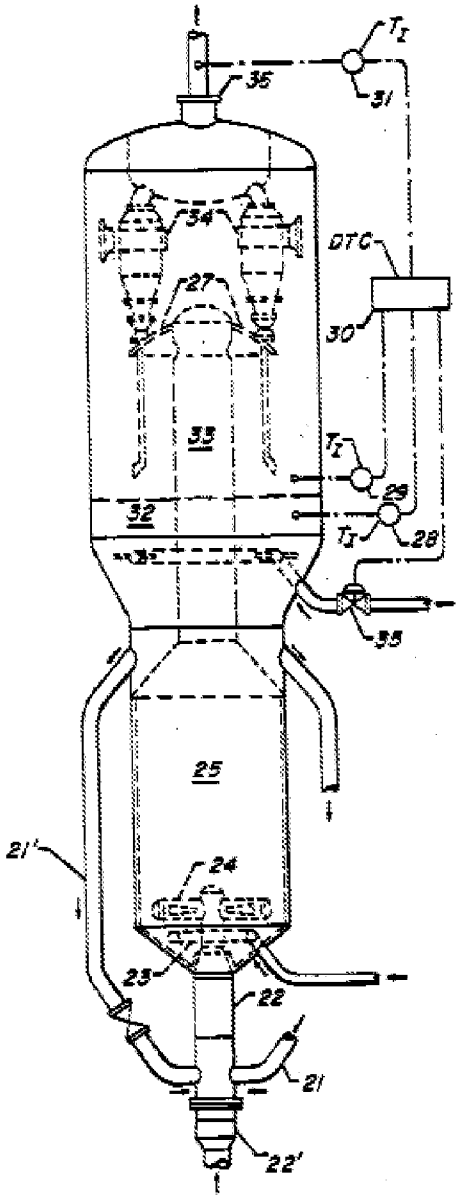



Figure 2




In regard to claim 2, Cabrera et al. teach a cylindrical regenerator arrangement [See Figure1].

In regard to claims 4, 8, 9, and 10, the functional limitations recited with regard to operating temperatures, amount of gas administered, and continuous process operation, do not patentably distinguish from the apparatus taught in the Cabrera reference. An apparatus claim with process steps is not classified as a "hybrid" claim; instead, it is simply an apparatus claim including functional limitations. A functional limitation is an attempt to define something by what it does, rather than by what it is (e.g., as evidenced by its specific structure or specific ingredients). There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. In re Swinehart, 439 F.2d 210, 169 USPQ 226 (CCPA 1971). A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used. A functional limitation is often used in association with an element, ingredient, or step of a process to define a particular capability or purpose that is served by the recited element, ingredient or step. See MPEP 2173.05. The apparatus disclosed by Cabrera is capable of operation at the claimed temperatures or flow rates and these functional limitations do not distinguish from the system of the prior art reference.

In regard to claim 5, Cabrera et al. teach a riser-type first regeneration zone that is fluidized [See Claim 1, Column 16, line 41].

In regard to claim 6, Cabrera et al. disclose the downward discharge of disengaged catalyst from the separation device (9) into the disengaging space (11) and collected in the dense bed regeneration zone [See Column 7, lines 30-34]. Any entrained particles of catalyst within the regeneration gas stream are separated and recovered downward to the dense bed zone [See Column 8, lines 27-33].

In regard to claim 7, Cabrera et al. teaches a second quantity of oxygen-containing regeneration gas typically air, enters this dense bed regeneration zone in the second section through conduit (13) and distribution device (14).

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**Claims 13 and 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cabrera et al. (US Patent No. 4,849,091) in view of Myers (US Patent No. 4,375,404).**

In regard to claim 13, Cabrera et al. teach a process for the regeneration of a catalyst in a regenerator vessel shown in Figure 1. The regenerator has a first section (7 and 8) which receives a carbon-contaminated catalyst and air (oxygen-containing gas) through conduit (1). The catalyst and combustion gas flow upward concurrently [See Column 3, lines 54-56]. The regenerator has a second 'disengagement space' (11). The spaces are of two different widths. **The spaces are of two different widths, with the width of the second space (11) greater than the space of the first section (7 and 8) as shown in Figure 1. The transitional portion which separates space (7) and space (8) is tapered as shown in Figure 1**. The riser regeneration zone (8) is operated at a higher gas velocity than the other sections due to its reduced cross section [See Column 6, lines 57-59]. **Cabrera et al. teach continuously adding spent catalyst into the regenerator at a rate of 1,354,634 kg/hour [See Column 13, lines 328-30].** The primary function of the first regeneration stage comprising combustion zone (7) and riser regeneration zone (8) is to maximize coke combustion to carbon monoxide while limiting the combustion of CO to $CO_2$ [See Column 6, lines 56-66]. The streams in the disengaging space (10) are combined with a second regeneration gas to convert the CO from the first stage. The disengaging space has a $CO_2$/CO mol ratio of

between 1 to 5 and of course greater than the same ratio in the regeneration gas exiting the riser [See Column 8, lines 8-11 or Column 17, lines 7-28].

**The Cabrera reference fails to teach a ratio of $CO:CO_2$ above 9.**

**Myers et al. is directed to the addition of chlorine to a regenerator method [See Column 7, lines 41-52].**

**One of skill in the art, at the time of Applicant's invention, would have been motivated to add chlorine to the regenerator to raise the ratio of carbon monoxide to carbon dioxide because the addition of chlorine to the gases in the regenerator results in an increase in the $CO/CO_2$ ratio and a concomitant decrease in the heat produced in the regenerator. The increased ratio is especially useful in meeting the heat removal requirements involved in regenerating catalysts which has been used in cracking carbo-metallic oils containing high concentrations of coke precursors and heavy metals and which are therefore heavily loaded with coke and heavy metals. [See Myers, Column 6, line 57 - Column 7, line 3].**

In regard to claim 15, Cabrera notes the maximum temperature differential will be dictated by the temperature limitations of the catalyst and equipment. For most catalyst operations, the maximum temperature is about 1450ºF [See Column 12, lines 65-68]. One of ordinary skill in the art, at the time of Applicant's invention would have been

motivated to optimize the temperature ranges within prior art conditions or through routine experimentation. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.). See MPEP 2144.05 IIA.

In regard to claim 16, Cabrera et al. disclose the downward discharge of disengaged catalyst from the separation device (9) into the disengaging space (11) and collected in the dense bed regeneration zone [See Column 7, lines 30-34]. Any entrained particles of catalyst within the regeneration gas stream are separated and recovered downward to the dense bed zone [See Column 8, lines 27-33].

In regard to claim 17, Cabrera et al. teaches a second quantity of oxygen-containing regeneration gas typically air, enters this dense bed regeneration zone in the second section through conduit (13) and distribution device (14).

In regard to claim 18, Cabrera et al. teach typically the amount of coke removed in the first regeneration stage comprises from about 50% to 90% [See Column 6, lines 57-59]. Looking to Applicant's specification for a definition of "substantially all of the carbon", this is taken to mean at least 60% of the coke on the catalyst [Applicant's specification, Page 6, 3rd Paragraph].

In regard to claim 19, Cabrera et al. teach continuously adding spent catalyst into the regenerator at a rate of 1,354,634 kg/hour [See Column 13, lines 28-30]

**Claims 3 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cabrera et al. (US Patent No. 4,849,091) as applied to claim 1 above, and further in view of Green et al. (US Patent No. 4,991,521) and Scott (US Patent No. 4,313,848).**

In regard to claims 3 and 12 Cabrera et al. discloses the two-section catalyst regeneration system as set forth in the claims. In Cabrera's Figure 1, the first regeneration zone is shown as having a greater height and a smaller diameter than the second separation zone but the reference fails to explicitly teach any values or ratios.

Green et al. teaches a catalyst regenerator in Figure 1. The regenerator has a first section (12) in which spent catalyst enters and a second section (13) connected by

an interface (13). The cross-sectional area of the second section is 15 to 90% of the average cross-sectional area of the first section [See Column 4, lines 19-22].

Scott et al. teaches the height of the upper section of the regeneration zone containing the bed of regenerated catalyst must be sufficient to permit essentially complete combustion of carbon monoxide in the regeneration gas stream in contact with the coke free catalyst [See Column 6, lines 48-52]

One of ordinary skill in the art, at the time of Applicant's invention, would be motivated to optimize the diameter and height of the upper and lower sections of the regeneration zone as shown in the Green and Scott references in such a way to reach a level of complete regeneration of the catalyst by combustion of coke to carbon monoxide. See MPEP 2144.04 IV-A with regard to changes in size and proportion.

**Claim 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cabrera et al. (US Patent No. 4,849,091) as applied to claims 1 and 13 above, and further in view of Scott (US Patent No. 4,313,848).**

In regard to claim 11, the Cabrera reference fails to teach a catalyst to convert carbon monoxide to carbon dioxide in the second regenerator section.

Scott teaches the use of a carbon monoxide combustion-promoting metal [See Column 5, lines 31-33].

One of ordinary skill in the art, at the time of Applicant's invention, would be motivated to include a catalyst like that taught in Scott in the apparatus disclosed in the Green reference to enhance the rate of carbon monoxide burning [See Scott, Column 5, lines 41-43].

**Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cabrera et al. (US Patent No. 4,849,091) in view of Myers (US Patent No. 4,375,404) and further in view of Green et al. (US Patent No. 4,991,521) and Scott (US Patent No. 4,313,848).**

In regard to claim 14, Cabrera et al. disclose the two-section catalyst regeneration method as set forth in the claims. In Cabrera's Figure 1, the first regeneration zone is shown as having a greater height and a smaller diameter than the second separation zone but the reference fails to explicitly teach any values or ratios.

Green et al. teaches a catalyst regenerator in Figure 1. The regenerator has a first section (12) in which spent catalyst enters and a second section (13) connected by an interface (13). The cross-sectional area of the second section is 15 to 90% of the average cross-sectional area of the first section [See Column 4, lines 19-22].

Scott et al. teaches the height of the upper section of the regeneration zone containing the bed of regenerated catalyst must be sufficient to permit essentially complete combustion of carbon monoxide in the regeneration gas stream in contact with the coke free catalyst [See Column 6, lines 48-52]

**Claim 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cabrera et al. (US Patent No. 4,849,091) in view of Myers (US Patent No. 4,375,404) and further in view of Scott (US Patent No. 4,313,848).**

In regard to claim 20, the Cabrera reference fails to teach a catalyst to convert carbon monoxide to carbon dioxide in the second regenerator section.

Scott teaches the use of a carbon monoxide combustion-promoting metal [See Column 5, lines 31-33].

One of ordinary skill in the art, at the time of Applicant's invention, would be motivated to include a catalyst like that taught in Scott in the apparatus disclosed in the Green reference to enhance the rate of carbon monoxide burning [See Scott, Column 5, lines 41-43].

***Response to Arguments***

Applicant's arguments filed 01/11/2010 have been fully considered but they are not persuasive. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action.

Applicants argue the Cabrera reference does not teach the claim limitations - namely the first and second spaces in the reactor vessel, a tapered transition portion, and a second width that is greater than the first width. These arguments are not persuasive. Based on Cabrera's Figure 1, the regenerator has a first section (7 and 8) which receives a carbon-contaminated catalyst and air (oxygen-containing gas) through conduit (1). The catalyst and combustion gas flow upward concurrently [See Column 3, lines 54-56]. The regenerator has a second 'disengagement space' (11). **The spaces are of two different widths, with the width of the second space (11) greater than the space of the first section (7 and 8) as shown in Figure 1. The transitional portion which separates space (7) and space (8) from space (11) is tapered as shown in Figure 1** and separates the first and second sections similar to what is interpreted as Scenario B in Applicant's arguments. The primary function of the first regeneration stage comprising combustion zone (7) and riser regeneration zone (8) is to maximize coke combustion to carbon monoxide while limiting the combustion of CO to $CO_2$ [See Column 6, lines 56-66]. The streams in the disengaging space (10) are combined with a second regeneration gas to convert the CO from the first stage.

Discharge is effected through disengaging device (9) into the second zone, which can also be interpreted as a tapered region in Cabrera's reactor system.

Applicants argue the Cabrera and Myers references fail to teach the limitations of claim 13, including gas velocities and the ratio of carbon dioxide to carbon monoxide produced. The first and second spaces are of two different widths, with the width of the second space (11) greater than the space of the first section (7 and 8) as shown in Figure 1. The transitional portion which separates space (7) and space (8) is tapered as shown in Figure 1. **The riser regeneration zone (8) is operated at a higher gas velocity than the other sections due to its reduced cross section [See Column 6, lines 57-59]. Cabrera et al. teach continuously adding spent catalyst into the regenerator at a rate of 1,354,634 kg/hour [See Column 13, lines 328-30].** The primary function of the first regeneration stage comprising combustion zone (7) and riser regeneration zone (8) is to maximize coke combustion to carbon monoxide while limiting the combustion of CO to $CO_2$ [See Column 6, lines 56-66]. The streams in the disengaging space (10) are combined with a second regeneration gas to convert the CO from the first stage. The disengaging space has a $CO_2$/CO mol ratio of between 1 to 5 and of course greater than the same ratio in the regeneration gas exiting the riser [See Column 8, lines 8-11 or Column 17, lines 7-28]. The Myers reference is cited to show motivation for operation that favors a high $CO_2$/CO ratio. **An increase in the $CO/CO_2$ ratio leads to the concomitant decrease in the heat produced in the regenerator. The increased ratio is especially useful in meeting the heat removal**

**requirements involved in regenerating catalyst which has been used in cracking carbo-metallic oils containing high concentrations of coke precursors and heavy metals and which are therefore heavily loaded with coke and heavy metals. [See Myers, Column 6, line 57 - Column 7, line 3].** One way of favoring a high ratio in the reaction method is to supply a chlorine additive in as explained in the Myers reference.

Applicants argue the claimed temperatures could not be chosen by determination of optimum working conditions. This is not found persuasive because Cabrera notes that temperature is a result effective variable. The maximum temperature differential will be dictated by the temperature limitations of the catalyst and equipment. For most catalyst operations, the maximum temperature is about 1450ºF [See Column 12, lines 65-68]. Temperatures below 1450ºF are within Applicant's claimed ranges.

Applicants argue Cabrera teaches away from the configuration as taught by Green and Scott. This is not found persuasive because based on the disclosure of the Green and Scott references one of skill would be motivated to optimize the diameter and height of the upper and lower sections of the regeneration zone in such a way to reach a level of complete regeneration of the catalyst by combustion of coke to carbon monoxide when the Cabrera reference does not give preferred sizes or ratios. See MPEP 2144.04 IV-A with regard to changes in size and proportion.

***Conclusion***

Claims 1-20 are rejected.

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER A. SMITH whose telephone number is (571)270-3599. The examiner can normally be reached on Monday - Friday, 9:30am to 6:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on (571)272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J.A. LORENGO/
Supervisory Patent Examiner, Art Unit 1793

Jennifer A. Smith
January 25, 2010
Art Unit 1793

JS